

## **Microbial Extremophiles for Earth and beyond: pushing the boundaries with synthetic biology**

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### **Abstract**

All organisms live in a multi-dimensional physical and chemical niche space. Discoveries in the 20<sup>th</sup> century enormously expanded the range of what was considered “habitable.” However, the current diversity of life on Earth begs the question of what terrestrial life – or indeed, another life form – would be capable of. With the needs of both modern laboratory science and the burgeoning field of biotechnology, as well as our deeply held desire to answer the question “are we alone in the universe?”, we are exploiting the tools of synthetic biology to probe the question of whether we can create “synthetic extremophiles” or, as our lab has dubbed them, “Hell Cells.”